NOTES FOR CHEMISTRY TEST

Not all constants and formulas necessary are listed, nor are all constants and formulas listed used on this test.

While attention has been paid to significant figures, no answer should be considered incorrect solely because of the number of significant figures.

CONSTANTS

Description	Value
Ideal gas constant (R)	0.0821 L•atm/(mol•K) = 8.31 J/(mol•K)
Faraday constant (F)	9.65×10^4 C/mol e^- = 9.65×10^4 J/(V•mol e^-)
Rydberg constant (R)	1.097×10^7 m^{-1}
Planck's constant (h)	6.63×10^{-34} J•s
Boltzmann constant (k)	1.38×10^{-23} J/K
Rydberg constant × Planck's constant × speed of light in a vacuum (Rhc)	2.18×10^{-18} J
Molal freezing point depression constant for water (K_f)	1.86°C/m
Molal boiling point elevation constant for water (K_b)	0.51°C/m
Heat of fusion of water (ΔH_{fus})	334 J/g = 80 cal/g = 6.01 kJ/mol
Heat of vaporization of water (ΔH_{vap})	2260 J/g = 540 cal/g = 40.7 kJ/mol
Specific heat (s) of water (liquid)	4.184 J/(g•K) = 4.184 J/(g•°C) = 1.0 cal/(g•°C)
Dissociation constant of water (K_w)	1.0×10^{-14} at 25°C
Standard atmospheric pressure	1 atm = 760 mm Hg = 760 torr = 101.325 kPa
Speed of light in a vacuum (c)	3.00×10^8 m/s
1 calorie (cal)	4.184 J
1 watt (W)	1 J/s

FORMULAS

Description	Formula
Gibbs free energy equation	$\Delta G = \Delta H - T\Delta S$
Nernst equation	$E = E° - \frac{RT}{nF} \ln Q$ $E = E° - \left(\frac{0.0257\ \text{V}}{n}\right) \ln Q$ at 298 K $E = E° - \left(\frac{0.0592\ \text{V}}{n}\right) \log Q$ at 298 K
Relationship between emf and free energy change for reactants and products in their standard states	$\Delta G° = -nFE°$
Energy change as an electron transitions between energy states	$\Delta E = Rhc\left(\frac{1}{n_i^2} - \frac{1}{n_f^2}\right)$
Equilibrium constant	$K_c = \frac{[C]^c \times [D]^d}{[A]^a \times [B]^b}$ for $aA + bB \rightleftharpoons cC + dD$
Conversion between K_c and K_p	$K_p = K_c(RT)^{\Delta n}$
Henderson-Hasselbalch equation	$\text{pH} = \text{p}K_a + \log\left(\frac{[\text{conjugate base}]}{[\text{acid}]}\right)$
Coulombs (C)	C = amperes × seconds
Photon energy	$E = h\nu$
Speed of light	$c = \lambda\nu$
Nuclear binding energy	$\Delta E = c^2\Delta m$
Boiling point/freezing point change	$\Delta T = Kmi$
Amount of heat (q)	$q = ms\Delta T$
Ideal gas law	$PV = nRT$
Root-mean-square speed	$u_{rms} = \sqrt{\frac{3RT}{M}}$
Graham's law of diffusion	$\frac{r_1}{r_2} = \sqrt{\frac{M_2}{M_1}}$
Pressure-volume work (at constant pressure)	$w = -P\Delta V$